

## REMARKS

Claims 7-11 have been canceled without prejudice as being drawn to a non-elected invention. Claims 1, 4 and 6 have been amended. Claims 12-18 have been added. Claims 1-6 and 12-18 are presented for examination

The amendment to claim 1 moves the recitation from the preamble at lines 1-3 to the body of the claim. This does not change the meaning, but ensures that the recitation is duly considered as part of the claimed subject matter.

Claim 6 has been amended so as to have no base claim or dependency of any sort. The amendment to claim 6 is to conform to more usual U.S. claiming format, and is unrelated to any reference or rejection.

As to new claim 12 added above, see Applicants' specification, e.g., at page 12, lines 12-14. As to new claim 13 added above, see, e.g., Applicants' original claim 6 and Applicants' specification at page 6, lines 5-7. As to new claim 14 added above, see, e.g., Applicants' specification at page 12, line 25. As to new claim 15 above, see, *id.*, page 13, lines 15-18; page 14, lines 1-3 and 11-13; page 15, lines 9-11. As to new claim 16 above, see original claim 6.

As to new independent claim 17, see, e.g., Applicants' specification at page 10, lines 4-6. As to new claim 18, see *id.*, page 11, lines 16-19.

At page 2 of the Office Action, Claims 1-4 have been rejected under 35 U.S.C. 102(b) as being anticipated by Lumley 3, 610,871 (1970). The Examiner cites col. 3, lines 37-60, and Fig. 4 of Lumley.

Applicants respectfully traverse the anticipation rejection of Claims 1-4. Applicants' Claim 1 recites "forming a concave portion in a surface of a glass substrate". Lumley does not disclose, or even imply, forming a concave portion in a surface of a glass substrate.

Lumley is working primarily with ceramics (abstract; col. 2, line 23), and also mentions "insulating substrates such as glass, alumina, ceramic, quartz, sapphire" and "semiconductive materials such as silicon or germanium slices". (Col. 3, lines 63-65). Lumley is concerned with controllably fracturing an assortment of substrates.

Lumley does not teach or disclose how to form a concavity on a glass substrate, without parting or separating the substrate. For example, Lumley

summarizes the first 3 columns of his patent by saying: "The above discussion assumed that the substrate was to be parted across its entire length." (Lumley, col. 3, lines 67-68.) Lumley then continues: "It will be appreciated, however, that the methods and apparatus disclosed herein are equally applicable to those situations where the fracture is to be initiated in the substrate some distance away from the edges". (Id., lines 67-71.) Also, Lumley states by way of introduction: "Broadly speaking, this invention relates to the parting of substrates" (col. 1, lines 4-5), and further states that his "invention contemplates a method of parting a substrate into at least two portions" (col. 1, lines 53-54). Lumley does not disclose or suggest the formation of a concave part in a glass substrate, as recited in Applicants' claims.

Wherefore, reconsideration and withdrawal of the anticipation rejection of Claims 1-4 are respectfully requested.

At page 3 of the Office Action, Claim 5 has been rejected under 35 U.S.C. 103(a) as unpatentable over Lumley in view of Rafla-Yuan 5,961,852. The Examiner admits that Lumley fails to teach the laser pulse is not more than 10 picoseconds. To supply this feature, the Examiner resorts to Rafla-Yuan, citing col. 4, lines 19-21 and asserting that given Rafla-Yuan's teaching, it would have been obvious to manipulate the pulse width to limit the distance the laser travels into the material.

Applicants respectfully traverse the obviousness rejection of Claim 5.

Lumley is not fairly cited against the presently claimed invention. Lumley does not teach or disclose concavity-forming. In the first instance a person of ordinary skill in the art with regard to concavity-forming on glass substrates would not consider Lumley. Lumley has been cited in later U.S. patents, apparently not having to do with concavity-forming, but predominantly with separating, cutting or fracturing.<sup>1</sup>

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<sup>1</sup>Some later U.S. patents that cite Lumley are, e.g.: 6,489,588, 6,420,678, 6,259,058 and 6,252,197 ("separating non-metallic materials"); 5,871,134 ("breaking and cutting a glass ribbon"); 5,826,772 ("breaking brittle materials"); 5,609,284 ("splitting non-metallic materials"); 5,578,229 ("cutting boards"); 4,562,333 ("stress assisted cutting of high temperature embrittled materials"); 4,328,411 ("cutting amorphous metal by crystallization"); 4,020,317 ("mining rock").

Lumley is much more removed from the presently claimed invention than the Examiner has admitted. As stated above, Lumley is directed to fracturing an assortment of surfaces. Fracturing would be seen as undesirable by a person of ordinary skill in Applicants' art wanting to form concavities, and such a person would not give further attention to Lumley, titled "Initiation of a controlled fracture". Moreover, Lumley does not teach or disclose forming a concavity on a portion of a glass substrate.

Nor does Rafla-Yuan teach or disclose concavity-forming on a glass substrate. Thus, even with Lumley and Rafla-Yuan, a person of ordinary skill in the art still could not arrive at the presently claimed invention of Applicants' independent Claim 1, or Applicants' dependent Claim 5.

Accordingly, reconsideration and withdrawal of the obviousness rejection of dependent claim 5 are respectfully requested.

At page 4 of the Office Action, Claim 6 has been rejected under 35 U.S.C. 103(a) as unpatentable over Lumley in view of Shinohara et al. 6,149,988. The Examiner admits that Lumley fails to teach that the formed groove has an angle of 30 to 120 degrees. However, the Examiner cites Shinohara (Fig. 1, ref. No. 6-2, 6-1, 24) and argues that it would have been obvious at the time the invention was made to combine Shinohara's teachings with Lumley's method of laser etching a glass piece because doing so would provide grooves of differing depths and properties.

Applicants respectfully traverse the obviousness rejection. Applicants' claim 6 as amended recites a "V-shaped groove formed in a surface of a glass substrate by laser irradiation, wherein an angle of from 30 degrees to 120 degrees is formed between opposite side surfaces of said V-shaped groove." Lumley is farther from the presently claimed invention than the Examiner has admitted. Lumley does not teach or disclose a "V-shaped groove formed in a surface of a glass substrate". Lumley teaches separation into two parts. Lumley is not concerned with keeping one substrate intact and creating a groove of a specific shape (a V-shape).

The groove shape is specifically recited in Applicants' Claim 6 as a V-shape, as opposed to a U-shape or a rectangular shape. See Applicants'

specification at page 1, lines 10-19, contrasting the undesirable U- and rectangular shapes with the recited V-shape. Lumley does not disclose groove-forming in the first instance. Nor, in the second instance, does Lumley disclose forming a groove of V-shape as opposed to U-shape or a rectangle. A person of ordinary skill in the art of V-shaped grooves would not pay attention to Lumley, relating to fracturing. Such a person would not treat Lumley as a primary reference in his V-groove work, but rather, would be using the conventional techniques for making V-grooves, as discussed in Applicants' specification (Background of the Invention) at page 2, line 8 *et seq.*

A person of ordinary skill in the art of V-shaped grooves reading Lumley and Shinohara would not have been motivated to modify Lumley in the direction of the invention of Applicants' claim 6. The Examiner's assumption as to how a person of ordinary skill in the art would reason is artificial and not how such a person would have reasoned. Nothing about Lumley and Shinohara would have brought such a person in the direction of a V-groove generally, much less the V-groove of Applicants' claim 6 with the angle between sides as claimed.

Lumley related to fracturing a piece into two pieces. Shinohara related to providing a thin film pattern on a glass substrate. Shinohara covered a glass substrate with an alkali ion blocking film made of silicon oxide, followed by forming an indium tin oxide (ITO) film. (Shinohara, col. 1, line 66+.) Shinohara emphasized that the melting points of the ion blocking film and the ITO film are very important. (Id., col. 2, lines 27-28.) Nothing about Lumley or Shinohara naturally calls for a person of ordinary skill in the art to combine their teachings, and Applicants disagree with the assumption that they would have been combined by such a person.

Moreover, even if a person of ordinary skill in the art were to attempt to modify Lumley based on Shinohara, the invention of Applicants' claim 6 would not result. Shinohara only mentions "grooves" or a "groove" very generally at col. 4, lines 53; 66; col. 5, lines 1, 9, 12, 16, 17. The most Shinohara says about the grooves is that "the grooves are narrow as compared with the remaining transparent conductive film." (Shinohara, col. 6, lines 51-53.) Thus, no matter how Lumley and Shinohara are combined, the invention of Applicants' claim 6 still does not result.

Wherefore, reconsideration and withdrawal of the obviousness rejection of claim 6 are respectfully requested.

At pages 4-5 of the Office Action, Claim 4 has been rejected under 35 U.S.C. 112, second paragraph, as indefinite. The phrase "said beam-condensing point" is characterized as lacking antecedent basis.

Above, to advance prosecution Claim 4 has been amended to express the same meaning without using the objected-to phrase. Reconsideration and withdrawal of the rejection under 35 U.S.C. 112, second paragraph of Claim 4 are respectfully requested.

In view of the foregoing, it is respectfully requested that the application be reconsidered, that claims 1-6 and 12-18 be allowed, and that the application be passed to issue. Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephone or personal interview. A provisional petition is hereby made for any extension of time necessary for the continued pendency during the life of this application. Please charge any fees for such provisional petition and any deficiencies in fees and credit any overpayment of fees to Attorney's Deposit Account No. 50-2041 (Whitham, Curtis & Christofferson).

Respectfully submitted,



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